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## The New Exchange Rate Policy in the Emerging Market Economies: with Special Emphasis on China

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# **The New Exchange Rate Policy in the Emerging Market Economies – with Special Emphasis on China**

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Diskussionsbeiträge des Institutes für Volkswirtschaftslehre

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## Abstract

In this paper, we discuss the new aspects of exchange rate policy which can be observed in the emerging market economies and their most likely implications for allocation, distribution and stabilization goals. A special emphasis is put on the Chinese case, where large interventions in the foreign exchange market point at a significant undervaluation of the Renminbi. With many alternatives at choice, Chinese authorities still prefer to peg their currency, by and large, to the US-Dollar. On July 21, 2005 a moderate revaluation and the introduction of a basket peg was announced, but a basket peg strategy is not yet visible in empirical figures. On the background of Germany's experiences of 1969, almost on the eve of the Bretton Woods' system collapse, we model a speculative attack on an undervalued currency in the vein of the Flood-Garber seminal paper from 1984. The contents of the model are reflected against today's reality in China, but also against Germany's experiences in the past century. We come to the conclusion, quite in line with Germany's experience of 1969, that the monetary authorities in China should anticipate such an attack and quickly proceed to a revaluation of the Renminbi. We then propose a sequence of reforms/policies which should be implemented in the aftermath.

JEL Classification: E58, F31, O23

Key words: Absorption Emerging markets economies, exchange rate policy, speculative attack, first generation models



## Contents

1	INTRODUCTION .....	1
2	THE CHOICE OF AN EXCHANGE RATE REGIME AFTER THE FINANCIAL TURMOIL IN THE 1990'S .....	2
3	THE EFFECTIVE EXCHANGE RATE AND PEGGING TO A SINGLE CURRENCY VS. TO A BASKET OF CURRENCIES .....	5
3.1	Pegging to the US Dollar ( $\hat{e}_{\$A} = 0$ ) .....	6
3.2	Alternative: Pegging to a Basket (Euro, US-Dollar) of Currencies ( $\hat{e}_A = 0$ ).....	7
3.3	Repercussions of a ten percentage appreciation of the euro against the US-Dollar at different forms of exchange rate pegging by country <i>A</i> .....	8
4	THE ALLOCATIVE AND DISTRIBUTIVE EFFECTS OF OVER- AND UNDERVALUATION .....	9
5	THE STABILIZATION EFFECTS OF AN UNDERVALUED CURRENCY: IS THERE A CASE FOR SPECULATIVE ATTACKS? .....	11
6	REFLECTING THE THEORETICAL CONSIDERATIONS ON CHINESE REALITY AND ON GERMANY'S PAST .....	19
7	BRIEF SUMMARY AND OUTLOOK .....	21
	ANNEX .....	23
	REFERENCES .....	27



## 1 INTRODUCTION

There can be no doubt: emerging market economies have organized a complete turnaround in their exchange rate policies since say the beginning of the new millennium. After the experiences gained during the Mexican (1994), the Asian (1997), the Russian (1998), the Brazilian (1998/1999) and the Argentinean (2001) crises, they discovered a new strategy: Pay back your debt to international organizations such as the IMF (Argentina and Brazil have paid in full – and earlier than expected – their entire outstanding obligations to the IMF amounting to \$ 15.46 billion and \$ 9.6 billion, respectively on December 2005), peg if you like your currency to a single currency or to a basket of currencies without committing yourself to a strict and passive rule as a currency board would command, accumulate foreign exchange reserves – be it to afford better a balance of payments crisis or be it to under value your own currency by systematic foreign exchange market interventions (buy foreign exchange/sell domestic currency). And something else is new: industrialized countries begin to worry about exchange rate policy of emerging market economies as they feel that these hamper their own export potential to these countries. There is now a second agenda for the access to the markets in emerging market economies beyond WTO.

Good bye the times when emerging market economies did the opposite, i.e. when they over valued their own currencies, spent and depleted their foreign exchange reserves to satisfy the excess demand on the foreign exchange market, committed themselves to the monetary authorities of a third country by currency board arrangements, became continuous and regular clients of the IMF incentivizing moral hazard behavior among domestic as well as foreign suppliers of credit. Industrialized countries in those days could be happy on the one hand with the implicit export promotion programme embedded in the overvaluation of the emerging market economies' currencies. On the other hand, they blamed emerging market economies for their risky management of foreign exposure and their reluctance to complement (internal and external) financial liberalization with a sound surveillance of domestic financial markets. Speculative attacks on the old exchange rate regimes could throw countries or even regions into a severe economic crisis, triggered by the initial financial market crisis.

Is that all over now? Most likely not, at least not in a broad meaning or sense. First: speculative attacks are not restricted to the case of countries with over valued currencies which sell foreign exchange to stabilize their exchange rates. Already the case of many countries which participated in the Bretton Woods system showed that there may well be speculation on the appreciation of a currency. Germany in 1969, can in fact serve as a good example for this phenomenon. Yet, the question arises whether the blow of such an exchange rate regime can also trigger a financial market crisis. Second: Brian Pinto's illuminating papers from the late 1980's and early 1990's receive a new relevance nowadays. His main point then was to look at the interaction between liberalization efforts in the foreign exchange market on the one hand and on the stabilization aspects arising from the budgetary consequences of such a liberalization on the other hand. As we intend to demonstrate in this paper, there is also a new liberalization/stabilization connection based on the modified ex-

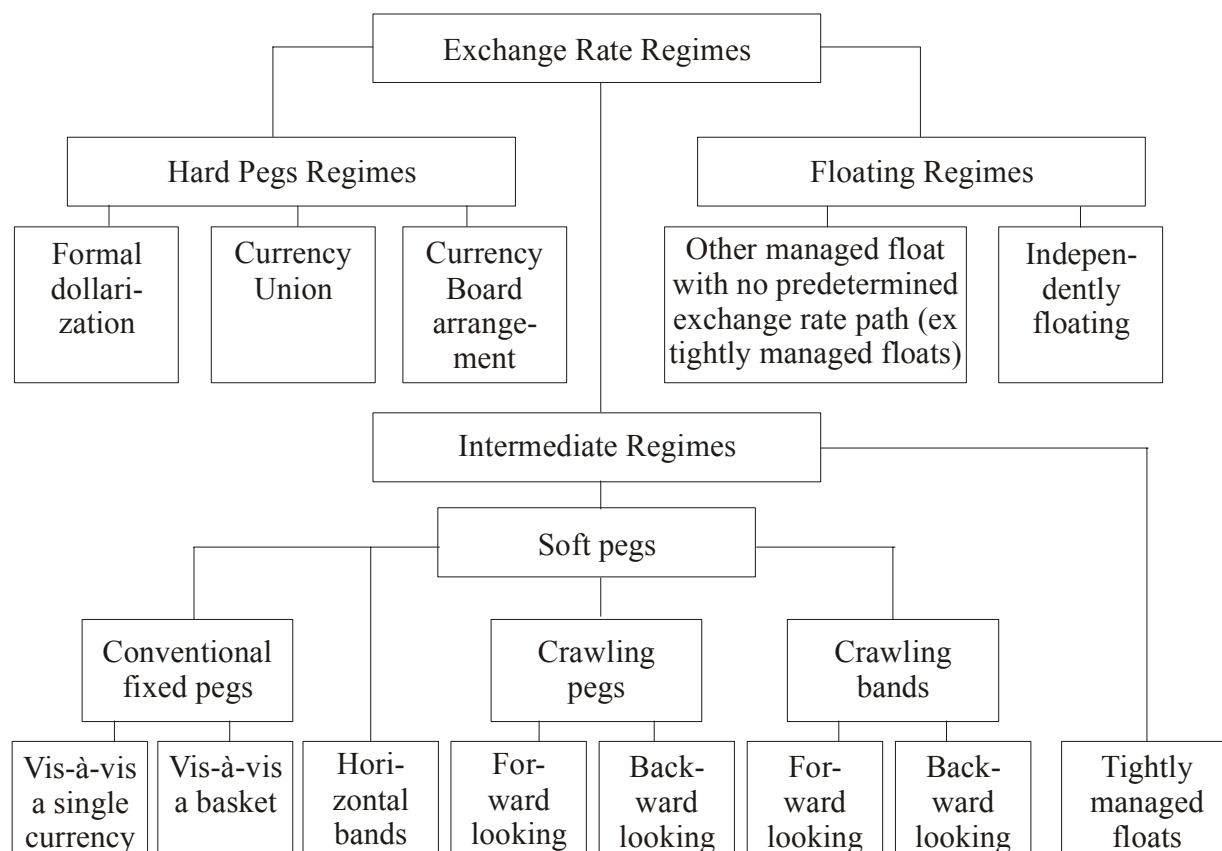


change rate policy in emerging market economies. There is an additional third aspect: major emerging market economies, with China figuring prominently, are nowadays in a totally different position with regard to the industrialized countries, especially to the US economy. Their exchange rate policy has meanwhile a significant impact on the size and the “allocation” of the deficit in the US balance of the current account. Something alike was the unthinkable during the 1970s. The 1980’s or even the 1990’s.

## 2 THE CHOICE OF AN EXCHANGE RATE REGIME AFTER THE FINANCIAL TURMOIL IN THE 1990’S

Since march 1973, the countries in the world economy are principally free to choose their exchange rate regime as the Bretton woods era was over. As the following Figure 1 demonstrates, this implies a rather broad portfolio of alternatives. At the beginning, it seems decisive to pursue either the left wing, the center or the right wing path. If a country favors an “intermediate regime”, it soon becomes obvious that the category of so-called “soft pegs” tends to destroy the a-priori seemingly great differences between “fixing”, “crawling” and “managing the float” of currencies. It is noteworthy that emerging market economies, unlike developed countries, have, on an average, moved between 1990 and 2001 by 50 percent from intermediate regimes to other intermediate regimes and by 50 percent to floating regimes (Bubula and Ötke-Robe, p. 19).

Figure 1 Exchange Rate Regimes

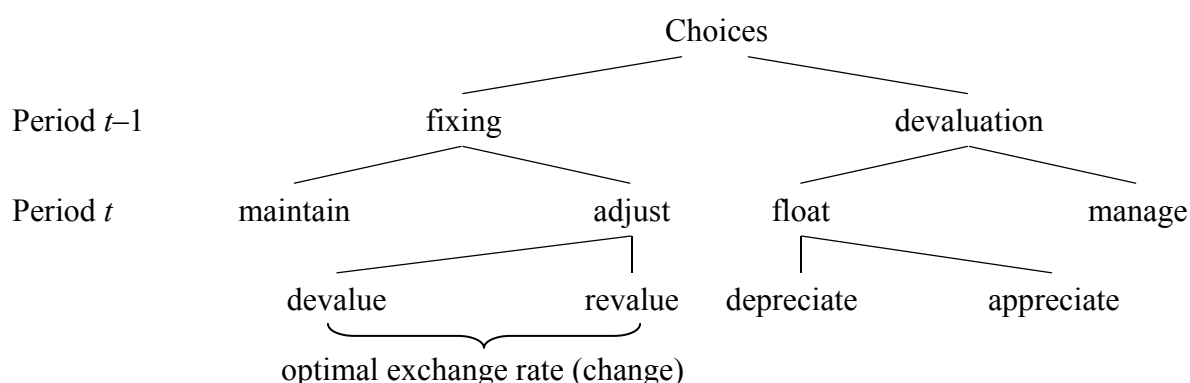


Sources: Bubula and Ötke-Robe (2002); Heiduk (2005).

Empirical evidence shows that increased capital mobility „has pushed countries toward either greater fixity or flexibility of exchange rate regimes, and that the regimes between the two extremes will be hollowing out as countries abandon regimes in the middle ground” (Bubula and Ötoker-Robe, p. 28). This statement needs a qualification, however. “In particular, countries have tended to move to more flexible forms of intermediate regimes, away from less flexible ones, in part to minimize potential trade-offs between competing policy objectives in a world with growing mobility of capital” (Bubula and Ötoker-Robe, p. 28).

The above “catalogue” albeit complete as one would wish, does not fully explain the ex-ante rational choice situation of a government who aims at optimizing its exchange rate policy. In principle, the decision problem resembles the one in the “delegation model” of optimal monetary policy. The latter, in turn, can be exemplified by a two-stage game (Figure 2). And, as we will show below, the possible outcomes, do in fact symbolize the above systematized alternatives. In the first stage of the game the authorities have to decide between “fixing” and a “flexible” exchange rate regime. If maintained in the second stage, the country in concern makes use of a hard peg or of a conventional fixed peg in the above sense. If, alternatively, it decides to adjust the exchange rate in the second stage, the result is some sort of discretion, among them as candidates, crawling peg or a crawling band.

Figure 2 Choices and strategies in a two-period decision problem



Source: own compilation.

If the government continues with a float, the exchange rate may, depending on domestic and foreign circumstances depreciate or appreciate. The government may instead begin to manage the float with a view on a target exchange rate. In this case, however, monetary repercussions have to be taken into account. Such a regime may come quite close to some of the soft pegs mentioned in Figure 1.

As two-stage games are usually solved backwards the task consists in first minimizing a more or less general macroeconomic loss function with respect to the exchange rate change. Once this optimal exchange rate change is found, the second step should be to determine the optimal exchange rate regime for the first period. This regime would in principle fit best to the needs of an exchange rate adjustment. Let us make an example: Suppose the optimal exchange rate change is zero, then the task is easy, because an unconditional fixed exchange rate regime is the one which enables us best to maintain a constant exchange rate. This case is named “commitment” by Obstfeld (1997, p. 64).

Suppose alternatively, the optimal exchange rate change is a 10 percentage increase in the exchange rate. Here, the solution is less trivial. This result can be either achieved by a discretionary devaluation, which implies the definition of a new target exchange rate (this case is called “discretionary escape clause” by Obstfeld (1997, p. 65)) or by a market induced depreciation. The latter in turn can be supported by an expansionary monetary impulse. Finally, when monetary policy is affected by too many impulse-reaction lags, direct interventions in the foreign exchange market may be necessary to achieve the target exchange rate (change). Each of these choices is associated with distinct costs (or benefits):

A discretionary devaluation goes along with psychological problems/personal costs of realignment for the government/policy makers who in the eyes of the public has/have abandoned an earlier “bastion” of foreign economic policy and hence “lost face politically” (Obstfeld 1997, p. 68). An expansionary monetary policy has all the deficiencies known best from the time inconsistency of optimal monetary policy plans literature. Interventions, or likewise exchange rate management, is (are) always confronted with the question of how sustainable these interventions can be.

In a recent contribution, Alesina and Wagner (2006) have found empirical evidence for the following hypotheses: “Countries that display fear of pegging, that is, do not keep to an announced peg, tend to be those with poor institutions. The reason is, we think, clear: Poor economic institutions are associated with poor economic management, and economic instability is incompatible with monetary stability and exchange rate pegs. By contrast, we find that by and large countries with “good” institutions display fear of floating, that is, they float less than announced, or put it differently they try to peg and limit exchange rate fluctuations despite not having said so in advance. Our explanation for this behavior is that these countries are afraid of wide exchange rate fluctuations (especially devaluations) which will be taken by market participants as an indicator of poor economic management. In other words, these countries peg more than announced to signal stability.” (Alesina and Wagner 2006, p. 797).

How do these findings relate to the below chart? What Alesina and Wagner (2006) are able to explain is that a “fear of floating” may lead countries to announce a flexible exchange rate, but then move to a management of the exchange rate, as it is depicted in the right wing (period 2) of our chart. Also, they explain, why countries with poor political institutions are “less able to stick to their announcements of fixing, they end up floating more than what they announce and often break commitments to pegging” (Alesina and Wagner 2006, p. 771). This issue is covered in part by the right wing (period 2) of the below chart. Thirdly, the rationality of fixing is also backed by Alesina’s and Wagner’s findings: “Because reneging on a commitment of fixing is associated with poor quality of institutions and of policies, more “virtuous” countries tend to avoid floating to raise their credibility and instead try to signal “rigor” (Alesina and Wagner 2006, p. 772). One may add, that in general, more foreign liabilities lead countries to prefer fixing (Alesina and Wagner 2006, p. 771).

There is a final aspect in the findings of Alesina and Wagner (2006, p. 775), where our chart, from a first glance, does not fit in total: “If a ‘good’ country wants to signal its ability to keep a stable ex-

change rate, then why announce a float and then peg rather than simply announce a peg and stick to it? One answer is that announcing a float allows some room to maneuver. For instance, in relatively ‘calm periods’ with no exchange rate crises, the fear of floating may be not too high, so this hypothetical country may use a bit of the flexibility allowed by having announced a float. On the other hand, in turbulent periods it may be especially important to ‘signal’ and keep the exchange rate constant – that is, the fear of floating is especially high.” In essence, this behavior can be interpreted as a temporary switch from a “float” to a “management” of the exchange rate (and backwards, if necessary).

If we look at actual exchange rate arrangements especially in East Asia, as this region was particularly affected by the financial market crisis in Thailand of 1997, we can observe the following: As Genberg (2006, p. 4) puts it, “the current exchange rate arrangements in East Asia span the entire spectrum from a very hard peg in the case of Hong Kong’s currency board arrangement to the (managed, the author) floating exchange rate arrangement of the Japanese yen.” China introduced three important changes in its exchange rate regime on July 21, 2005: first to stabilize in the future its currency with reference to a basket of currencies, second a one-step revaluation of the Renminbi of 2.1 % against the US-Dollar and third to allow the exchange rate to fluctuate within a  $\pm 0.3\%$  band around a daily announced central parity (BIS 2006, p. 87). The Malaysian authorities moved to a basket peg in late summer of 1998. Singapore stabilizes an effective exchange rate as an intermediate target to reach an inflation target (BIS 2006, p. 5). Finally, countries such as Indonesia, the Philippines, South Korea and Thailand do proclaim that they pursue an inflation targeting strategy, which at the end of the day seems to have implications for their behavior on the foreign exchange market. Some sort of “managed floating” seems to be in practice.

Given the official statements we have refereed to which claim in several cases that basket pegging/stabilization of an effective exchange rate is in operation, it seems worthwhile to analyze for a moment the implications of a single currency peg relative to a basket peg and then come back to the existing exchange rate arrangements in East Asia.

### 3 THE EFFECTIVE EXCHANGE RATE AND PEGGING TO A SINGLE CURRENCY VS. TO A BASKET OF CURRENCIES

Given the fact that a number of emerging economies pretend to stabilize an effective exchange rate/to peg their own currency to a basket of currencies, we should briefly review the “mechanics” of the effective exchange rate (see Bender 1985). As stated in equation (3.1), the effective exchange rate is a weighted product of bilateral exchange rates of the currency of country A vis-à-vis to the currencies of other countries, the weights being usually derived from trade figures:

$$e_A = (e_{1A})^{w_1} \cdot (e_{2A})^{w_2} \cdot \dots \cdot (e_{nA})^{w_n} = \prod_{i=1}^n (e_{iA})^{w_i}, \quad \sum_{i=1}^n w_i \quad (3.1)$$

with  $e_A$  = effective exchange rate,  $e_{iA}$  = bilateral exchange rate between country  $i$  and country  $A$ , and

$w_i$  = trade weight of trade partner  $i$ . For example  $w_i^{EX} = EX_{Ai}/EX_A$  are exports designated to country  $i$  as share of total exports of  $A$ , and  $w_i^{IM} = IM_{Ai}/IM_A$  are imports stemming from country  $i$  as share of total imports of  $A$ .

Assumption: Country  $A$  has its main trade links with the USA and with the euro zone. Hence, we can simplify (3.1) to

$$e_A = (e_{\text{€}A})^\alpha \cdot (e_{\$A})^{(1-\alpha)}. \quad (3.2)$$

with  $\alpha$  as trade weight of the euro zone and  $(1-\alpha)$  of the USA, respectively. Given the bilateral exchange rate between the euro zone and the USA

$$e_{\text{€}\$} = e_{\text{€}A}/e_{\$A} \quad (3.3)$$

we get for the bilateral exchange rates  $e_{\text{€}A}$  and  $e_{\$A}$

$$e_{\text{€}A} = e_{\text{€}\$} \cdot e_{\$A} \quad (3.4a)$$

$$e_{\$A} = e_{\text{€}A}/e_{\text{€}\$}. \quad (3.4b)$$

Using (3.3), (3.4a) and (3.4b), (3.2) can be rewritten to

$$e_A = (e_{\text{€}\$})^\alpha \cdot (e_{\$A})^\alpha \cdot (e_{\$A})^{(1-\alpha)} = e_{\$A} \cdot (e_{\text{€}\$})^\alpha \quad (3.5a)$$

$$e_A = (e_{\text{€}A})^\alpha \cdot \left( \frac{e_{\text{€}A}}{e_{\text{€}\$}} \right)^{(1-\alpha)} = e_{\text{€}A} \cdot (e_{\text{€}\$})^{-(1-\alpha)} \quad (3.5b)$$

Written as percentage changes gives:

$$\hat{e}_A = \hat{e}_{\$A} + \alpha \hat{e}_{\text{€}\$} \quad (3.6a)$$

$$\hat{e}_A = \hat{e}_{\text{€}A} - (1-\alpha) \hat{e}_{\text{€}\$}. \quad (3.6b)$$

Now, with the help of equations (3.6a) and (3.6b), we can detect the consequences for the exchange rate of country  $A$ /the implied intervention rules the central bank of country  $A$  has to follow on the foreign exchange market. Let us evaluate the alternatives “pegging to a single currency” vs. “pegging to a basket of (two) currencies.”

### 3.1 Pegging to the US Dollar ( $\hat{e}_{\$A} = 0$ )

Following such a strict rule can be accomplished, for example, by a currency board such as the one installed in Argentina in the 1990's.

From (3.6a), we achieve:

$$\hat{e}_A = \alpha \hat{e}_{\text{€}\$}. \quad (3.7a)$$

Rewriting (3.6b):

$$\hat{e}_A = \hat{e}_{\epsilon A} - (1 - \alpha)\hat{e}_{\epsilon \$}. \quad (3.7b)$$

Equating (3.7a) with (3.7b):

$$\alpha\hat{e}_{\epsilon \$} = -(1 - \alpha)\hat{e}_{\epsilon \$} + \hat{e}_{\epsilon A} \quad (3.8)$$

results in:

$$\hat{e}_{\epsilon A} = \hat{e}_{\epsilon \$}. \quad (3.9)$$

Hence, both exchange rate changes on the left and on the right hand side of (3.9) can be observed ex-post empirically. If (3.9) strictly holds, an appreciation (depreciation) of the euro vis-à-vis to the US-Dollar leads to a corresponding appreciation (depreciation) of the euro vis-à-vis to the currency of country  $A$ .

Suppose, we observe alternatively over time a small depreciation of the US-Dollar against the currency of country  $A$ , such as  $\hat{e}_{\$A} < 0$ , say the depreciation of the US-Dollar against the currency of  $A$  amounts only to a fraction of the depreciation of the US-Dollar vis-à-vis to the euro:  $\hat{e}_{\$A} = -\lambda\hat{e}_{\epsilon \$}$ ; ( $0 < \lambda \leq 1$ ).

Introducing this modification gives:

$$\hat{e}_A = -\lambda\hat{e}_{\epsilon \$} + \alpha\hat{e}_{\epsilon \$} = (\alpha - \lambda)\hat{e}_{\epsilon \$} \quad (3.10a)$$

$$\hat{e}_A = \hat{e}_{\epsilon A} - (1 - \alpha)\hat{e}_{\epsilon \$} \quad (3.10b)$$

$$(\alpha - \lambda)\hat{e}_{\epsilon \$} = -(1 - \alpha)\hat{e}_{\epsilon \$} + \hat{e}_{\epsilon A} \quad (3.11)$$

$$(1 - \lambda)\hat{e}_{\epsilon \$} = \hat{e}_{\epsilon A}. \quad (3.12)$$

In this case, the euro does not appreciate as much against the currency of country  $A$  as towards the US-Dollar. If pegging to the US-Dollar is some sort of exchange rate protection, as, at a flexible exchange regime, the US-Dollar would depreciate against the currency of country  $A$  to a more or less large degree,  $\lambda$  is some sort of a proxy for the liberalization of the exchange rate regime. If  $\lambda$  goes to one, European exporters to country  $A$  are not harmed by the depreciation of the US-Dollar on the world's foreign exchange markets.

### 3.2 Alternative: Pegging to a Basket (Euro, US-Dollar) of Currencies ( $\hat{e}_A = 0$ )

Again, recurring to equations (3.6a) and (3.6b), we now achieve:

$$\hat{e}_{\$A} = -\alpha\hat{e}_{\epsilon \$} \quad (3.13a)$$

$$\hat{e}_{\epsilon A} = (1 - \alpha)\hat{e}_{\epsilon \$}. \quad (3.13b)$$

This rule would imply that in the case of an appreciation (depreciation) of the euro against the US-Dollar, the domestic central bank has to intervene at the foreign exchange market. The central bank

can choose between the options

- to provide for a  $(1 - \alpha)$ -times appreciation of the euro against the domestic currency (euro-foreign exchange market), or
- to provide for a  $\alpha$ -times depreciation of the US-Dollar against the domestic currency (US-Dollar-foreign exchange market).

Whenever the data for the period under inspection show significant exchange rate movements between the US-Dollar and the euro on the one hand, but little changes in the exchange rate between the domestic currency and the euro and/or the US-Dollar, the credibility of the officially announced basket pegging would be rather low. This holds on the condition that the weights  $(1 - \alpha)$  and  $\alpha$  are of significant size, which implies the euro zone and the US economy to be important partners in international trade.

China has claimed to have introduced some sort of a basket of currencies on July 2005 and to have switched away from the earlier peg to the US-Dollar. The basket, so it is said, consists of the US-Dollar, the euro, the yen, and the Korean won. “In addition, the Singapore Dollar, the British pound, the Malaysian ringgit, the Australian dollar, the Russian ruble, the Thailand baht and the Canadian dollar are taken into consideration” (Siebert 2006, p. 16). How credible is this announcement? In fact, “the RMB/dollar rate was allowed to appreciate by 2.1 percent in July 2005, when the new exchange rate regime was announced, but has only been allowed to increase by the less than 1 percent since that time” (Dorn 2006, p. 23).

If a country argues that it has skipped a single currency peg in favor of a basket peg, there is, following Genberg (2006, p. 6), an easy way to detect the “truth”; for a country that stabilizes the effective exchange rate, “the ratio of US dollar volatility to effective rate volatility ... would be very large.” But ... “with the notable exception of Hong Kong, Mainland China, and Malaysia the volatility ratio is far from zero” (Genberg 2006, p. 6).

### 3.3 Repercussions of a ten percentage appreciation of the euro against the US-Dollar at different forms of exchange rate pegging by country $A$

Finally, we can evaluate the consequences of the alternative forms of pegging presented above. In the first place, we make some simple assumptions on the nature and size of the weights used when calculating the effective exchange rate

Table 1 Foreign trade structure of country  $A$

Trade partner	Foreign Trade Structure of Country $A$	
	$A$ 's-exports Share, $w_i^{EX}$	$A$ 's-Imports Share, $w_i^{IM}$
Euro zone	0.4	0.6
USA	0.6	0.4

Now we can compute the implied exchange rate changes:

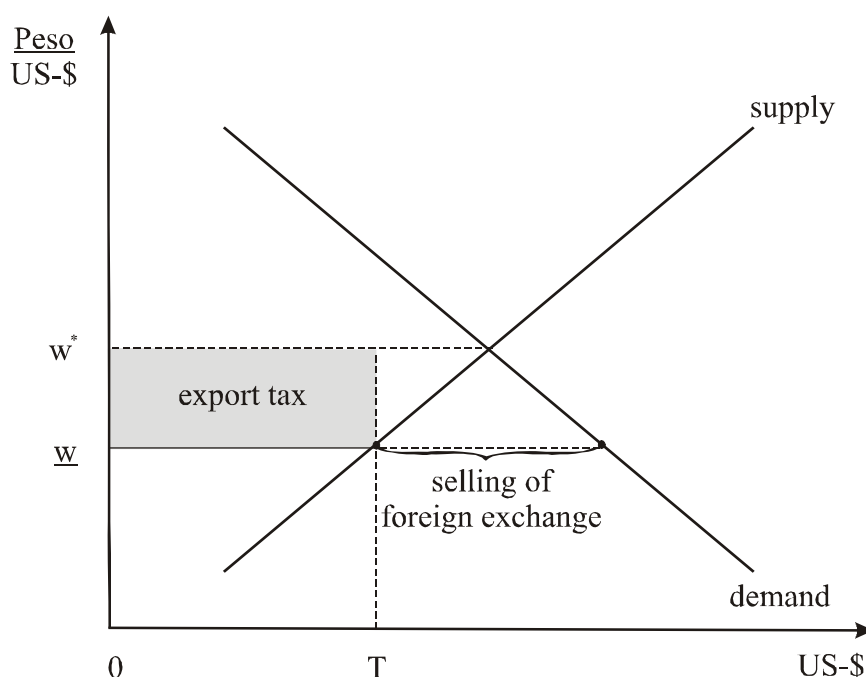
Table 2 Implied exchange rate changes

Trade weights in the effective exchange rate	Form of Pegging		
	€-Pegging (target: $\hat{e}_{\text{€A}} = 0$ ; $\hat{e}_{\text{€\$}} = -10\%$ )	\$-Pegging (target: $\hat{e}_{\text{\$A}} = 0$ ; $\hat{e}_{\text{€\$}} = +10\%$ )	Basket-Pegging (target: $\hat{e}_A = 0$ )
Import weights	Result: $\hat{e}_A = -4\%$	Result: $\hat{e}_A = +6\%$	Rule: $\hat{e}_{\text{€A}} = +4\%$ , $\hat{e}_{\text{\$A}} = -6\%$
Export weights	Result: $\hat{e}_A = -6\%$	Result: $\hat{e}_A = +4\%$	Rule: $\hat{e}_{\text{€A}} = +6\%$ , $\hat{e}_{\text{\$A}} = -4\%$

## 4 THE ALLOCATIVE AND DISTRIBUTIVE EFFECTS OF OVER- AND UNDERVALUATION

In the “old days”, emerging market economies tended to overvalue their currencies with the primary goal to ease the import of capital goods and, thereby to foster economic development. The impact of such a system on the allocation of goods and factors of production is to tax domestic exports (and capital imports from the rest of the world) and, hence to lower the domestic factor prices of those factors which are intensively used in the production of these goods, as can be depicted in Figure 3.

Figure 3 The mechanics of an overvalued currency



Sources: own compilation.

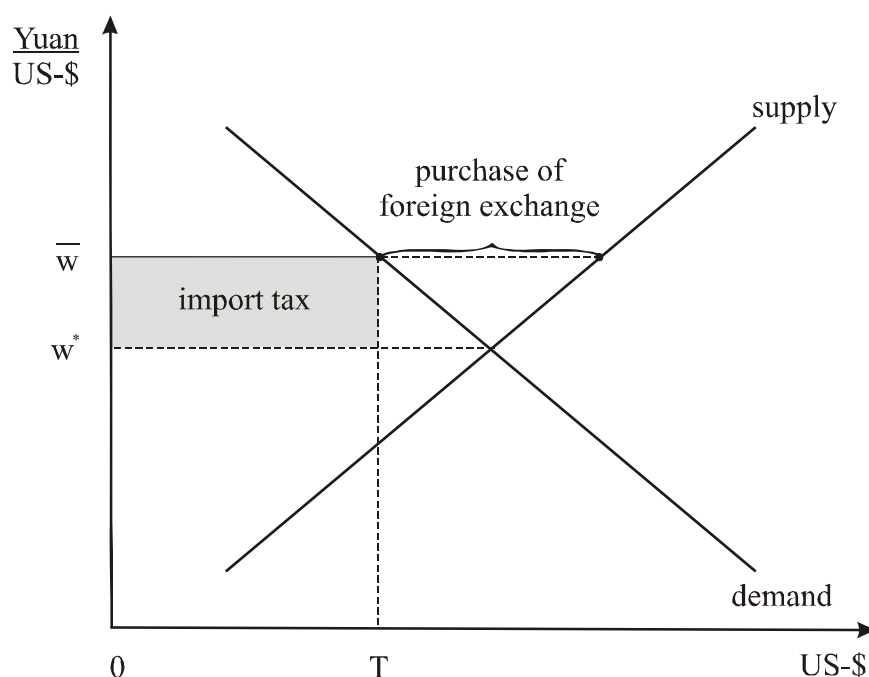
From a development strategy point of view, it is not unreasonable for an emerging market economy to run current account deficits which lead to continuous net capital inflows. As capital is scarce, these flows are in line with the interests of foreign investors who aim at earning attractive real interest rate incomes. A major objection against this view, however, is that this result would under “normal circumstances” come about by market forces alone, that is, one would expect that a real interest rate differential in favor of emerging market economies should prevail anyway and net capital inflows would command the current account to turn into a deficit.



In the more recent past, we observe somehow the opposite strategy, at least among some of the major players in East Asia, such as China: “The People’s Bank of China continues to peg the nominal exchange rate at a disequilibrium level, as indicated by the rapid accumulation of foreign exchange reserves that now exceed \$800 billion. To prevent inflation (and to maintain a quasi fixed rate, the author), the PBC sells securities to drain off the RMB that is created when the bank buys foreign currencies. That ‘sterilization’ process, however, becomes more difficult as the size of China’s current account surplus grows” (Dorn 2006, p. 29).

The impact of such a system on the allocation of goods and factors of production is to tax imports (and capital exports of domestic agents) – one may recall in this respect that the EU is nowadays complaining of China’s high import taxes on automobile components and may bring the issue to the WTO court – and, hence to lower the foreign income of those factors which are intensively used in the production of these goods, as can be depicted in Figure 4.

Figure 4 The mechanics of an undervalued currency



Sources: own compilation.

As Dorn (2006, p. 31) puts it, “it makes no sense for a capital-poor country like China to run persistent current-account surpluses that lead to net capital outflows – particularly, the massive accumulation of foreign exchange reserves (these amounted to around 819 billion in December 2005, accounting for 40 percent of GDP, Siebert (2006, p. 15) and, in the meantime exceed 950 billion my mid of 2006) used primarily to purchase U.S. government securities.” In the first place, because there should exist more attractive investment opportunities in the domestic economy than foreign government securities. Secondly, because it is more than counterintuitive seeing an emerging market economy to export capital to the rest of the world. And thirdly, because this sort of strategic exchange rate policy is meant to boost one’s own exports to the detriment of competitors within the group of emerging market economies in particular. In a recent empirical study, Eichengreen and

Tong (2006, p. 239) found that “low-wage exporters of labor intensive consumer goods have reason to fear Chinese competition.” As Siebert (2006, 18) adds, “an undervaluation means higher renminbi prices for agricultural products since these products are quoted in US dollar and China is a price taker (on the world markets, the author). This in turn implies a lower real income of industrial workers. Furthermore, the sector structure would be distorted in favor of the export industry” (see above). Not surprisingly, the US and other WTO member countries claim that in such a scenario, trade and exchange rate policy have to be considered jointly in order to assess the “true protection” effects (not to be confounded with the original contributions by Larry Sjaastad and David Greenaway (see for the references Sell 1988) to a “true protection” concept for trade policy alone, see Tokarick 2006) of both policies taken all together.

## **5 THE STABILIZATION EFFECTS OF AN UNDERVALUED CURRENCY: IS THERE A CASE FOR SPECULATIVE ATTACKS?**

The literature dealing with speculative attacks on the currencies of emerging market economies is dominated by the classification of “first”, “second” and “third” generation models of financial market crises (see Sell 2001 for an overview). Overvalued currencies figure prominently among the “stylized facts” of these models and this is convincing since the financial market crises modeled in these approaches such as the EMS I crises of 1992/93, the Mexican crisis of 1994, the Asian crisis of 1997, the Russian crisis of 1998 and the Brazilian crisis of 1998/99 went along with this phenomenon. Can one really think of a speculative attack, let alone of an ensuing financial market crisis, when the currencies in concern are under- instead of overvalued?

Yes, one can, if we consider it legitimate to learn from history in general and from the days in which the Bretton Woods’ system was almost expiring in particular. Remember that since the late 1960’s this system, many times advocated as “fixed peg”, more and more turned into a “soft peg” as a number of the famous “ $n-1$ ” countries became more and more reluctant to import inflation from the US. As Hoffmann (1969) pointed out, in a world of weak or non existing capital controls, you cannot promise to the public at the same time a constant exchange rate and a stable price level whenever your partners in trade and capital flows experience (a higher) inflation (Hoffmann 1969, p. 3). This is in essence the content of the famous “Trilemma” in economic policy of open economies.

The case of West Germany in 1969 can even serve as an example for a speculative attack on an undervalued currency. As is well known, West Germany at the time was governed by a first “grand coalition” between the christian democrats (CDU/CSU) and the social democrats (SPD). Almost at the end of the term, in spring of 1969, a heated debate separated the former legendary couple of “Plisch” and “Plum” (Wilhelm Busch), that is the minister of public finance, Franz Josef Strauss (CSU) and the minister of economic policy, Karl Schiller (SPD). Schiller was a strong proponent of a revaluation of the Deutschmark, while Strauss defended to maintain the central parity vis-à-vis to the US-Dollar.

Schiller's argument, firmly supported by the council of economic advisors to the federal government (Sachverständigenrat zur Begutachtung der gesamtwirtschaftlichen Entwicklung, SVR), basically put forward that Germany at the time was continuously "invaded" by massive short-term speculative capital inflows which forced the Deutsche Bundesbank (BUBA) to pursue a sterilization policy – if an import of inflation should be avoided – which was neither sustainable nor adequate for the medium-term German business cycle. In the short-run, according to Schiller, the overheated German economy would profit from a revaluation, as one could expect more imports and less exports.

As opposed to this, Strauss denied the need for a revaluation of the Deutschmark. His point was that a revaluation should be avoided as it would harm German producers and exporters of agricultural products within the European Community. As the agricultural products within the EU were denominated in so-called "green Dollar", their equivalent in Deutschmark would fall in the case of a DM revaluation (Zimmermann 1969, p. 395). Also, he said that keeping a constant central parity would boost overall German exports and so stabilize the German business cycle on a medium-term perspective. Finally, according to him, such a policy would signal the US authorities constancy and good neighbor ship on the part of German economic policy.

That time German chancellor Kurt Georg Kiesinger (CDU), making use of his "Richtlinienkompetenz" and his one-vote majority in the council of German ministers, overruled the social democratic members of the government and refused to revalue the Deutschmark on May 9, 1969. Consequently, the social democrats made this subject a key issue within their electoral campaign in September of 1969 and were apparently able to convince a small majority of Germans of the necessity to revalue the Deutschmark after general elections. Only a few days after Willy Brandt took over, on October 27, 1969, the Deutschmark was revalued by 9.3 (taking into account all accompanying measures) percent and speculation ceased. The new government, by the way, had allowed the Deutschmark to float freely, but only temporarily between September 30, and October 8, 1969 (Köhler 1969, pp. 348, 350).

According to Germany's former central banker and then vice-president of the Deutsche Bundesbank, Otmar Emminger (later in the 1970's, he should become president of the BUBA), three main objectives were pursued with this measure (Emminger 1970, pp.1-2):

- First, the reduction, if not abolishment of insecurity on the foreign exchange markets.
- Second, a reduction of Germany's surpluses in the balance of the current account and, thereby, a better provision of goods for the domestic economy.
- Third, a dampening of excess demand on the domestic goods' markets in conjunction with a stabilization of the inflationary upward pressure in domestic prices.

As Emminger (1970, p. 2) reports, the revaluation of the Deutschmark had a fulminate effect on capital outflows: between October and December, 1969 the BUBA sold foreign exchange in the magnitude of 23 billion Deutschmark. This represented about 45 percent of Germany's total official

foreign exchange reserves. These outflows more than matched the calculated 20 billion Deutschmark capital inflows observed between February and September, 1969.

Opposite to the effects observed during and after the “Asian Flu”, the BUBA experienced not only a significant loss of reserves after the revaluation of the Deutschmark, but also a negative wealth effect with regard to the remaining reserves: Before revaluation, one US-Dollar was 4.0 Deutschmark worth, after it was only 3.66 DM. Fritz Zimmermann (1969, p. 393) estimated the negative wealth effect related to the new valuation of the (remaining) foreign exchange reserves to be in the neighborhood of 4.3 billion Deutschmark.

Edgar Salin (1971, pp. 199–200) observes that the BUBA could have avoided wealth losses by converting their US-Dollar holdings into gold; however, at the time, the US authorities might have had difficulties to satisfy the corresponding gold demand. He also points at the necessity to do exchange rate realignments to the surprise of the public. In a way, he anticipates the Lucas critique and the policy inefficiency lemma, according to which only unexpected policy instruments can achieve real effects. In fact, an unexpected revaluation was no longer possible in the case of Germany given the for more than six months lasting discussion on the topic in academia and in the policy scene. Translating this topic into the Chinese case means that the government is still capable to surprise the public as to the timing/dating of the revaluation of the Renminbi, and, of course, with regard to the size.

The following model is in the tradition of the Flood-Garber approach to explaining speculative attacks and follows closely the version put forward by Gärtner and Lutz (2004, pp. 334–41).

$$m_t = p_t + \phi y - \lambda i \quad (5.1)$$

$$i_t = i^* + E(\dot{e}_{t+1}) \quad (5.2)$$

$$e_t = p_t - p^* \quad (5.3)$$

$$M_t = F_t^Z + B_t^Z \quad (5.4)$$

The first equation (5.1) represents a money market equilibrium, (5.2) stands for the uncovered interest rate parity, (5.3) gives the relative version of purchasing power parity and (5.4) explains domestic money supply as the sum of foreign reserves and domestic bonds in the portfolio of the central bank. In addition, during the stabilization of the exchange rate phase, we have:

$$e_t = \bar{e} \quad (5.5)$$

$$\frac{B_{t+1}^Z - B_t^Z}{B_t^Z} = -\mu. \quad (5.6)$$

Permanent foreign exchange market interventions induce a continuous sterilization policy; the latter implies the reduction of government bonds in the portfolio of the central bank by a constant rate  $-\mu$ . Further assumptions are: All variables with small letters are natural logarithms except the interest rates. Domestic income,  $y$ , the foreign price level,  $p^*$  and interest rate,  $i^*$  are exogenous.

Solving the model for the exchange rate leads to:

$$e_t = m_t - \phi y + \lambda i^* + \lambda E(\dot{e}_{t+1}) - p^*. \quad (5.7)$$

As long as there is a fixed exchange rate which is credible,  $E(\dot{e}_{t+1}) = 0$  and (5.7) reduces to

$$\bar{e} = m_t - \phi y + \lambda i^* - p^*. \quad (5.8)$$

As all other variables are exogenous, a fixed exchange rate is only compatible with a constant supply of money ( $m_t = \bar{m}$ ):

$$\bar{m} = \bar{e} + \phi y - \lambda i^* + p^*. \quad (5.9)$$

As equation (5.4) shows, domestic money supply equals the foreign exchange reserves of the central bank plus the amount of bonds held by the monetary authorities. For reasons of simplicity, we assume the money multiplier to be one. As the central bank continuously intervenes in the foreign exchange market, buying foreign exchange (selling domestic currency), sterilization ( $\dot{M} = 0$ ) implies that the central bank has to reduce the stock of bonds held:

$$\dot{M}_t = \dot{F}_t^Z + \dot{B}_t^Z \quad (5.10)$$

$$-\dot{B}_t^Z = \dot{F}_t^Z \quad (5.11)$$

$$\dot{m}_{t+1} = m_{t+1} - m_t = (f_{t+1}^Z - f_t^Z) - (b_{t+1}^Z - b_t^Z). \quad (5.12)$$

The central bank, hence, accumulates reserves, and, at the same time, reduces the outstanding credit extended to the domestic real sector. This process will necessarily come to an end, because a net domestic credit outstanding of zero is not a sustainable position for the monetary authorities, as domestic interest rates will rocket to unprecedented levels. The question arises, however, as to when this point in time ( $T$ ) will be reached. It can be characterized by

$$M_T = F_T^Z \quad (5.13)$$

$$B_T^Z = 0 \quad (5.14)$$

$$m_T = f_T^Z. \quad (5.15)$$

After the collapse of the old exchange rate regime, the authorities will start to remonetise the domestic economy:

$$\begin{aligned} M_{T+1} &= F_T^Z + B_{T+1}^Z; \\ M_{T+2} &= F_T^Z + B_{T+2}^Z; \\ \dot{M}_{T+2} &= F_T^Z + B_{T+2}^Z - (F_T^Z + B_{T+1}^Z) = B_{T+2}^Z - B_{T+1}^Z \\ m_{T+2} - m_{T+1} &= \frac{\dot{M}_{T+2}}{M_{T+1}} = \frac{B_{T+2}^Z - B_{T+1}^Z}{F_T^Z + B_{T+1}^Z} = \mu - \nu. \end{aligned} \quad (5.16)$$

The growth of domestic money, however, falls short of the growth of domestic credit outstanding:

$$b_{t+2}^Z - b_{t+1}^Z = \frac{\dot{B}_{t+2}^Z}{B_{t+1}^Z} = \frac{B_{t+2}^Z - B_{t+1}^Z}{B_{t+1}^Z} = \mu \quad (5.17)$$

But  $v$  is a function of time and diminishes quickly as time goes by:

$$v = v(T + j), \quad \lim_{j \rightarrow \infty} v(T + j) = 0, \quad j = 1, \dots, n. \quad (5.18)$$

In complementing the seminal paper of Flood and Garber (1984), we assume that there exists in the foreign country an analogous money demand equilibrium:

$$m_t^* = p_t^* + \phi y^* - \lambda i^*. \quad (5.19)$$

Combining (5.19) with (5.1) and (5.3) gives:

$$e_t = m_t - m_t^* - \phi(y - y^*) + \lambda(i - i^*). \quad (5.20)$$

Taking account of equation (5.2) modifies (5.20):

$$e_t = m_t - m_t^* - \phi(y - y^*) + \lambda E(\dot{e}_t). \quad (5.21)$$

If both domestic and foreign income levels equal their equilibrium values, the exchange rate depends on the different rates of monetary expansion and of exchange rate expectations. The actual exchange rate follows a downward trend as long as the foreign rate of monetary expansion exceeds the domestic rate and agents foresee a future appreciation:

$$\frac{\partial e_t}{\partial m_t^*} = -1 - \lambda \frac{\partial E(\dot{e}_t)}{\partial m_t^*} < -1. \quad (5.22)$$

Equation (5.21) holds as long as the monetary authorities accumulate foreign reserves to maintain the exchange rate fixed and, at the same time, reduce the domestic credit outstanding. Once the latter approaches a zero level, or is pushed down actively to this level by speculators ( $T$ ) who sell foreign exchange to the central bank, domestic monetary authorities, as we have argued above, will start to remonetise the economy.

$$e_{T+j} = m_{T+j} - m_{T+j}^* - \phi(y - y^*) + \lambda E(\dot{e}_{T+j}), \quad j = 1, \dots, n \quad (5.23)$$

with  $\lim_{j \rightarrow \infty} m_{T+j} - m_{T+j}^* = 0$  and  $\lim_{j \rightarrow \infty} E(\dot{e}_{T+j}) = 0$ .

This means that the exchange rate will follow a “smoothing path” towards a new stable exchange rate between the domestic and the foreign economy. This process is accompanied by a continuous decrease of domestic interest rates towards the interest level in the foreign country. Domestic and foreign inflation rates will converge, provided the domestic central bank mimics the expansion of liquidity as it is organized by the foreign central bank.

Which factors determine whether the speculative attack will occur sooner or later. Here, we follow closely Flood and Garber (1984) by calculating first the shadow exchange rate. What sort of exchange rate is this? As Gärtner and Lutz (2004) put it, this exchange rate would hold if there were no foreign exchange market interventions carried out by the monetary authorities:

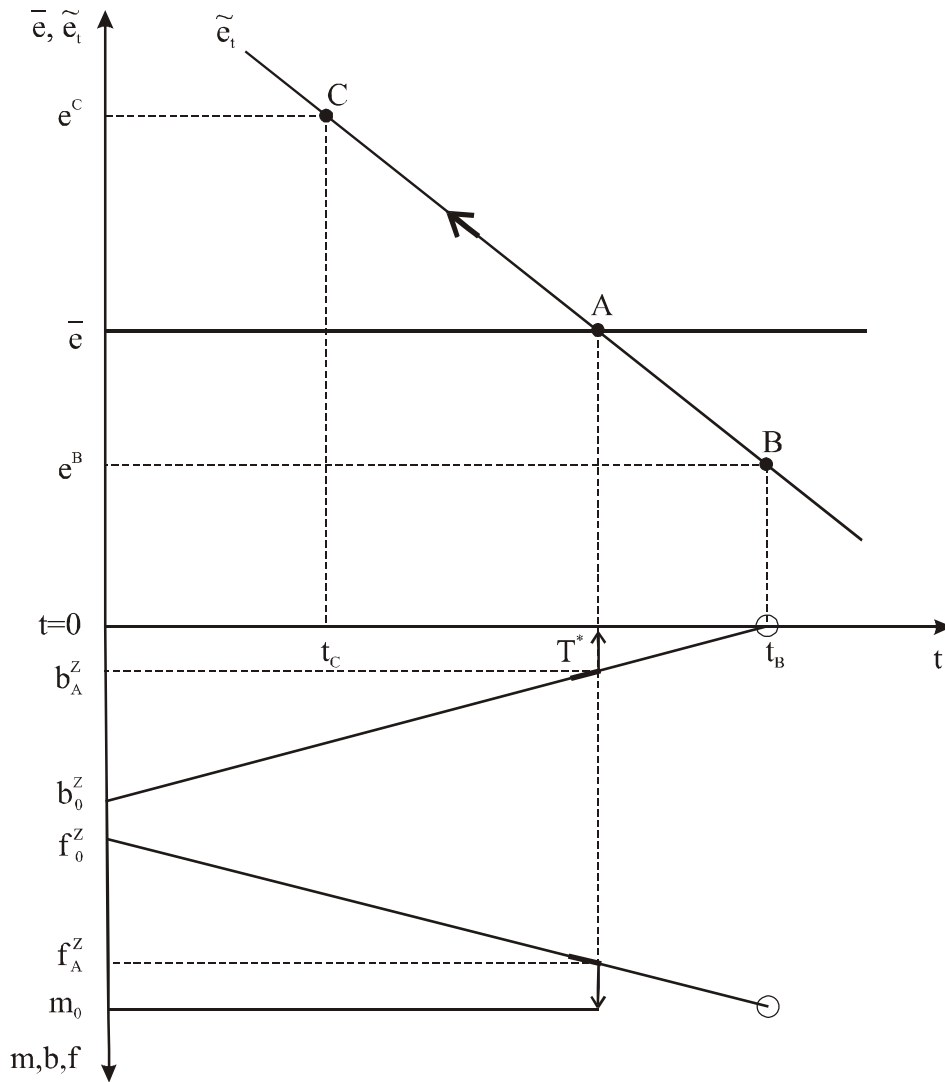
$$\tilde{e}_t = b_t^Z - \phi y + \lambda i^* + \lambda E(\dot{e}_{t+1}) - p^*. \quad (5.24)$$

As  $b_t^Z = b_0^Z - \mu t$ ,  $\tilde{e}_t = b_0^Z - \mu t - \phi y + \lambda i^* + \lambda E(\dot{e}_{t+1}) - p^*$ , and  $E(\dot{e}_{t+1}) = E(\dot{m}_{t+1}) = -\mu$ , which finally gives:

$$\tilde{e}_t = b_0^Z - \mu t - \phi y + \lambda i^* - \lambda \mu - p^*. \quad (5.25)$$

A graphical interpretation of (5.25) would be represented by the following Figure 5.

Figure 5



Sources: own compilation.

But this view seems to hold only up to the point A, or, likewise, if there was no speculative attack, up to point B and is, therefore, not totally correct. What is missing, is a careful inspection of what happens during and after a speculative attack. Then, we have to take into account (see above):

$$\begin{aligned}
M_T &= F_T^Z; \\
M_{T+1} &= F_T^Z + B_{T+1}^Z; \\
\dot{M}_{T+1} &= F_T^Z + B_{T+1}^Z - F_T^Z = B_{T+1}^Z \\
m_{T+1} - m_T &= \frac{\dot{M}_{T+1}}{M_T} = \frac{B_{T+1}^Z - 0}{F_T^Z + 0} \cong \mu - \nu
\end{aligned} \tag{5.26}$$

and

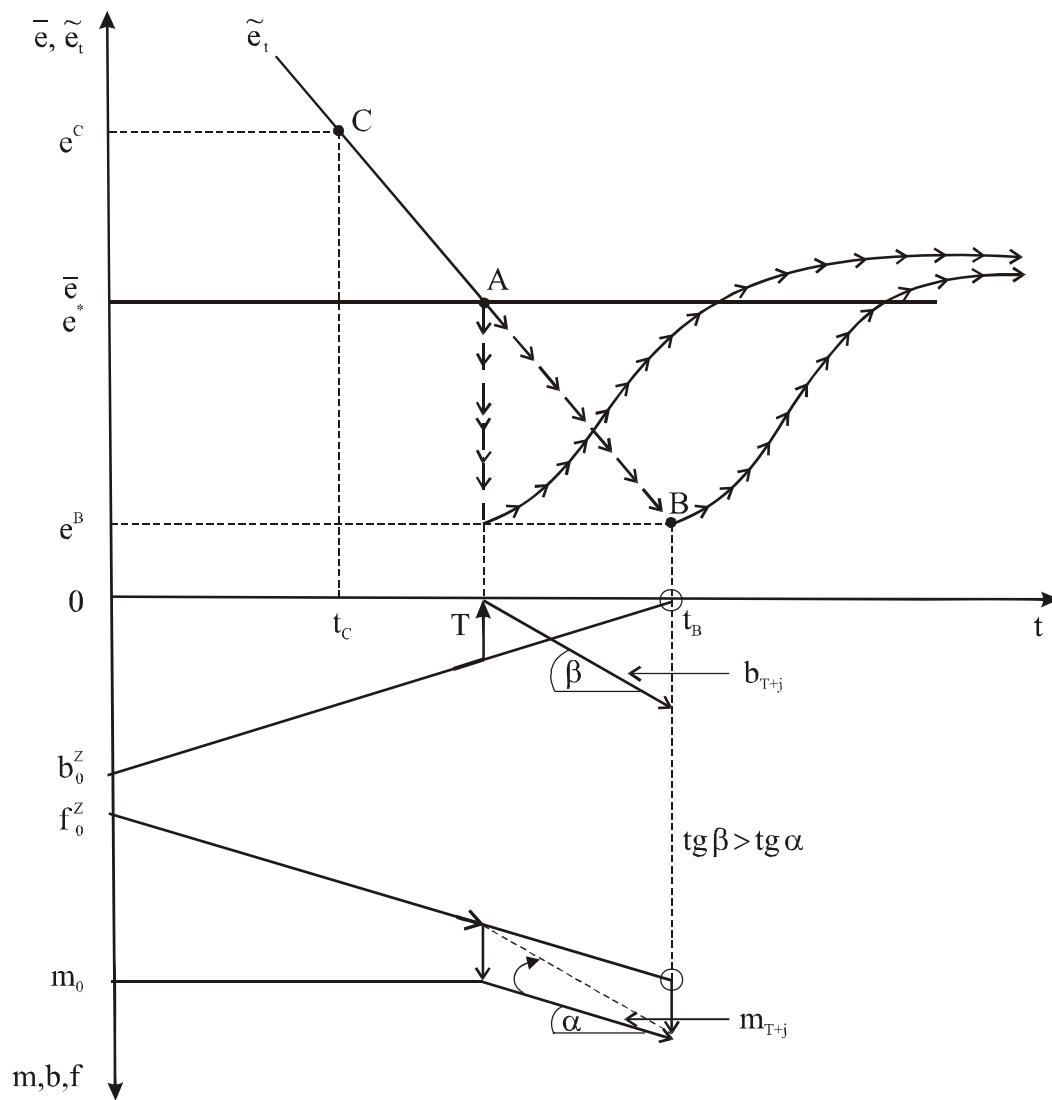
$$E(\dot{e}_{T+1}) = E(\dot{m}_{T+1}) = m_{T+1} - m_T = \mu - \nu. \tag{5.27}$$

Hence:

$$e_T = \bar{e} = b_0^Z - \mu T - \phi y + \lambda i^* + \lambda(\mu - \nu) - p^*. \tag{5.28}$$

A graphical interpretation of (5.28) is given by the alternative following Figure 6:

Figure 6



Sources: own compilation.



If the attack occurs it will occur in point A or likewise in period  $T$ , for the same reasons given in the original contribution of Flood/Garber: If a speculator waits until the stock of domestic bonds in the possession of the central bank is “sold out” (at point B), he comes late, as the central bank is no longer willing to buy foreign exchange. What, if a speculator attacks the central bank much earlier, say around the time where point C is reached? In this case, if the central bank would cease to intervene, the exchange rate would jump into its value  $e_C$  and hence devalue with respect to  $\bar{e}$ . This would imply severe losses on the part of all investors who sold foreign exchange to the central bank previously.

Alternatively, the exchange rate could appreciate until reaching point B where we also find no more domestic bonds in the portfolio of the central bank without having experienced a speculative attack. In both cases, the subsequent remonetisation of the economy is accompanied, because of (5.26), by a continuous depreciation (with growing rates) of the domestic currency. Most likely, the domestic authorities will decelerate the dynamics of buying bonds when reaching and surpassing the exchange rate level  $\bar{e}$ . As a consequence, the exchange rate path becomes s-shaped. Notice that in the lower part of the graph, we have depicted the development of money supply and of the stock of bonds in the portfolio of the central bank. As shown above, the growth rate of money supply as measured by the angle  $\alpha$  falls short of the growth rate of domestic bonds as measured by the angle  $\beta$ , at least in the short-run. In the medium to long-run, both rates will converge.

$$T = \frac{-\bar{e} + b_0^Z - \phi y + \lambda i^* + \lambda(\mu - v) - p^*}{\mu}. \quad (5.29)$$

Because of (5.9) –  $\bar{m} = \bar{e} + \phi y - \lambda i^* + p^*$  – we can alternatively state:

$$T = \frac{-\bar{m} + \ln(M_0 - F_0^Z) + \lambda(\mu - v)}{\mu}. \quad (5.30)$$

Following equations (5.29) and (5.30), the speculative attack will be implemented the later ( $T$  will be the higher),

- the lower the stabilized exchange rate;
- the lower the initial level of foreign exchange reserves;
- the higher the initial level of domestic bonds in the portfolio of the central bank;
- the lower domestic income which depresses domestic money demand
- the higher the foreign interest rate;
- the lower the foreign price level as this (by purchasing power parity) lowers domestic money supply;
- the lower  $v$ .

One should be careful, however, when sort of “applying” this model one to one to the actual situation of emerging economies, for example to the case of China. In the present, the People’s Bank of

China is sterilizing incompletely the effects of its exchange rate policy; as a matter of fact, the base interest rate was increased on May 1, 2006 as the authorities are afraid of an overheating economy with money growth exceeding by far the presumed target values. The latter can serve as an indicator for incomplete sterilization. At the same time, raising core interest rates gives an additional incentive to foreign speculators to deposit their money in China which puts pressure on the Renminbi upwards and strengthens the speculation on a revaluation of China's currency. While it is true that there exist capital controls and a "management" of interest rates, additional capital inflows coupled with surpluses in the balance of trade make the intervention/sterilization job more and more difficult for the Chinese authorities. The example of Germany in 1969 is a warning memory.

## 6 REFLECTING THE THEORETICAL CONSIDERATIONS ON CHINESE REALITY AND ON GERMANY'S PAST

Now with the intuition of the table and the two graphs in the annex, where we have plotted the Renminbi/US-Dollar exchange rate, the Renminbi/euro exchange rate and the US-Dollar/euro exchange rate, we can draw the following conclusions:

- Since early 2001, there is a clear depreciation trend of the US-Dollar against the Euro;
- this development is almost mirrored a hundred percent by the development of the Renminbi against the Euro;
- at the same time, there is a slight appreciation of the Renminbi against the US-Dollar;
- hence, it seems obvious that the Chinese authorities continue to peg their currency by and large against the US-Dollar;
- a sort of "cross check" is as follows: as the above tables would suggest, in the case of basket pegging and a significant appreciation trend of the Euro against the US-Dollar, the development of the Renminbi against the Euro and the development of the Renminbi against the US-Dollar **must** have the opposite sign, no matter how different the **size** of depreciation or likewise appreciation is. The latter, in turn, depends on the weighting scheme chosen and on the weights itself.
- This result is robust, that is, it does not depend on the total number of currencies beyond the Euro and the US-Dollar considered in the virtual basket. As long as the trend between the Euro and the US-Dollar points upwards or downwards, the trends in the exchange rate changes between the Renminbi and the euro on the one hand and the Renminbi and the US-Dollar on the other hand have to be opposite once a basket peg is installed.

To maintain the exchange rate by and large fixed, Chinese monetary authorities have accumulated by the third quarter of 2006 more than 900 billion US-Dollars, and, as Goodfriend and Prasad mention, "the spike in the pace of reserve accumulation during 2001–04 (and this holds for 2005 and 2006 as well, the author) is largely attributable to a surge in speculative capital inflows. "In China,

... the appreciation pressure has recently been driven as much by capital inflows as by current account surpluses” (Mohanty and Turner 2006, p. 41). In so far, a basic assumption underlying our model of a speculative attack against an undervalued currency, is backed by the facts of today’s China. As McKinnon and Schnabl (2006, p. 32) state, “the PCB makes a profit out of its foreign exchange operations. The PCB sells central bank Yuan-denominated bonds to the good burghers of Shanghai while buying much higher-yield bonds.” In fact, as the BIIS reports, in China the stock of outstanding central bank securities “rose rapidly to constitute 15 % ... at the end of June 2006” (Mohanty and Turner 2006, p.47). Yet, their later conclusion, that the PCB can effectively control money growth is not convincing. The fact that foreign exchange market interventions are attractive for the PCB at present is a signal which stabilizes rather than destabilizes speculation in favor of the Renminbi.

Yet, speculation is a necessary, but not a sufficient condition for a successful speculative attack. Hence, a possible criticism against the model’s view may argue that according to the “open economy trilemma”, an exchange rate target can be defended if the domestic policy gives in either in the field of capital controls or in the field of monetary policy. What about the type of and the effectiveness of China’s capital controls? Little can be found in the relevant literature on this subject. However, it seems to be that controls are more concerned with (and also more effective on) capital outflows than with (on) capital inflows. Capital controls together with domestic financial repression aim at maintaining the interest rate on PCB bills at low levels (Mohanty and Turner 2006, p. 36). “Altogether, it seems unlikely that capital controls can be counted upon to provide much scope for independent monetary policy in the presence of a tightly managed exchange rate” (Mohanty and Turner 2006, p. 35).

An independent monetary policy could be confirmed or rebutted in principle on two grounds: either by finding (or not finding) ex-post that the monetary authorities despite the exchange rate target have achieved their goals in the field of price stability or when sterilization policy has been (or not has been) effective as measured by the envisaged (and achieved) growth rates for reserve money. According to Xie (2004), the monetary base is the operational target of the PBC. As the actual figures tend to show, China’s monetary policy has not been independent no matter which of these two yardsticks is applied. Indirectly, this result also points at the (rather low) effectiveness of Chinese capital controls.

Under these circumstances, the rigidity of the Chinese exchange rate has severe consequences for China’s monetary policy. Horst Siebert (2006, p. 15) reports: “Since there is the need to sterilize monetary expansion, the People’s Bank of China (PBC) sells sterilization bonds (PBC bills) to the state-owned banks. From 2003 to 2004 the stock of sterilization papers increased by about 265 percent, from 2004 to 2005 it increased by about 88 percent or by a value of US\$ 117 billion – reaching a value of 250 billion US\$ for the overall stock of bonds ... However, this vast increase covers only slightly more than half of the increase in reserves. Not all of the outside money can be sterilized; thus there is an increase in liquidity showing up in low inter-bank interest rates and the strong

increase in credits.” Siebert’s figure is not totally correct, because the sterilization coverage never exceeded a level of around 48 % (Goodfriend and Prasad 2006, p. 24).

Sterilization is harmful to the allocation of resources for two reasons: when banks buy PBC bills instead of making loans, this crowds out bank lending. As a matter of fact, in China, “over 80% of central bank securities were held by banks at the end of 2005” (Mohanty and Turner 2006, p. 47). “If the non-bank public purchases PBC bills instead, then the public holds less bank deposits” (Goodfriend and Prasad 2006, p. 36). This, in turn, lowers financial intermediation. Financial repression such as interest rate ceilings on deposits and loans (together with the emission of low interest rate PCB bills, see above) help the Chinese monetary authorities to dampen the domestic interest rate level. The trade off between “liberalization gains” and “stabilization gains” demonstrated above with the implicit export tax serving as example will, however, apply here again. Once the authorities begin to abolish financial repression, the impact of sterilization policies on domestic interest rates will work as presumed in our model.

The experiences made by Germany in 1969 tend to demonstrate that the postponement of a necessary revaluation goes along with severe macroeconomic imbalances: the inflationary pressures had become so strong in Germany that a dampening through the adjustment in the exchange rate and the concomitant effects on trade and capital flows were insufficient to restore stability. Contractionary domestic monetary and fiscal policy had to contribute to the goal of stabilization. Would such a scenario be welcome in an environment of continuous high economic growth in China?

## 7 BRIEF SUMMARY AND OUTLOOK

As the two graphs in the annex demonstrate, the Yuan/US-Dollar exchange rate has been rather stable in the immediate past. Since early 2002, the euro has recovered firmly against the US-Dollar. Hence, if the Chinese authorities would have stopped interventions at the foreign exchange market, the US-Dollar (euro) should have depreciated (appreciated) even more against the euro (US-Dollar). Does it mean that Chinese interventions have contributed to stabilize employment in Europe, given that the Euro would have won even more strength without Chinese interventions and European exports might have suffered? Who knows?

Recently (on August 14, 2006), the PBS has fixed the announced central parity against the US-Dollar at 7.98 Renminbi per US-Dollar. This constitutes an appreciation of about 1.6 percent within a month (say between mid of July, when the exchange rate stood at 8.11 Renminbi per US-Dollar, and mid of August, 2006). As the booming economy (with an expected yearly growth rate for 2006 beyond 11 percent) cannot be stabilized with such small revaluations steps, the authorities supplemented their exchange rate policy by increasing the base rate to a level of 6.12 percent on August 18 (in January 2006 it had a level of 5.60 percent). Yet, among the experts for the Chinese economy, nobody expects that these measures taken will suffice to stabilize the economy in general and the pressure on consumer prices in special (Handelsblatt 08/21/2006).

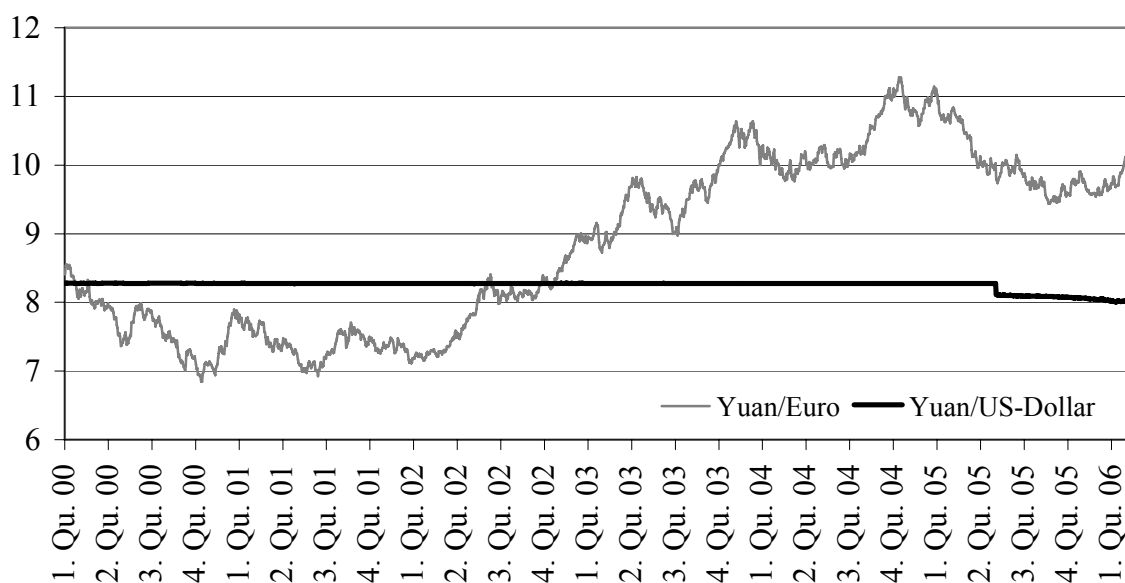
What about China's options in the near future? As Goldwin puts it, "Meade (1951) emphasized over 50 years ago, (that, the author) the classical remedy for an economy experiencing both domestic overheating and external surpluses is exchange rate appreciation, and neither reserve nor debt considerations appear to constrain such exchange rate action" Goldstein (2004, p.12). If, on the opposite, "China persists in sticking to an undervalued parity for the Renminbi and keeps accumulating reserves at recent rates, the real undervaluation of the Renminbi will ultimately be undone by a further increase in China's inflation rate" (Goldstein 2004, p. 33). Now as it stands, China is not yet in a position to quickly abolish financial repression, to lift up capital controls and to install "overnight" a flexible exchange rate. Sound suggestions from the profession of economists range from a "managed float" to a "basket pegging". Given the not so good experiences we have gained with (more or less discretionary) exchange rate management (some experts prefer the notion "manipulation"), a basket peg offers the advantage of combining a higher stability (rule character) with a sufficient flexibility (towards external shocks).

Hence, China's reform of its exchange rate regime could follow this sequence: *First* organize soon (to avoid Germany's experience of spring 1969) a discretionary revaluation of the Renminbi of say 10–15 percent. As a consequence, neither a loss of China's external competitiveness nor substantial negative effects on FDI flows should be feared (Prasad et al. 2006, pp. 7–10). *Second*: If the authorities observe a vanishing pressure on the foreign exchange market, then proceed to the installment of a "real" basket peg. If not, let the Renminbi appreciate by market forces for a short while. As Prasad et al. (2006, p. 5) observe, the exchange rate can "still be allowed to fluctuate in response to the evolution of supply and demand of foreign exchange, even though there may be constraints on capital flows." The basket should include China's main trade partners, the US, the euro zone and Japan figuring prominently. In doing so, China, by and large, would then import the mean inflation of its trading partners. *Third*: Reform and stabilize domestic financial markets by the abolishment of domestic financial repression, the privatization of state banks, the set up of a sound supervision of domestic financial markets. *Fourth*: Only then a lifting of remaining capital controls and a full convertibility of the capital account can be organized. *Fifth*: After the completion of steps one through four, China could move on to the definition of an explicit inflation goal as a nominal anchor and take the risk of a flexible exchange rate.

We follow Prasad et al. (2006, p. 4) that "the experiences of numerous emerging market economies have shown the risks associated with maintaining a fixed exchange rate (in our case: a basket peg, the author) in tandem with a capital account that is open in either de jure or de facto terms, especially if there are weaknesses in the domestic financial system." Though Chinese authorities may in fact control domestic residents and their demand for foreign assets, the same does not apply with regard to the demand of foreign agents for domestic assets, as it would totally contradict the "philosophy" chosen with regard to private direct foreign investment since a couple of years.

## ANNEX

Figure A.1 The Development of Core Exchange Rates (01/2000–05/2006)



Sources: Federal Reserve Bank of New York, own calculation.

Figure A.2 The Development of US-Dollar/Euro Exchange Rate (01/2000–05/2006)



Sources: Federal Reserve Bank of New York, own calculation.

## **Classification of exchange rate regimes**

Source: Bubula and Otker-Robe (2002).

### Exchange Regimes with Another Currency as Legal Tender (Formal “Dollarization”)

The country uses the currency of another country, which circulates as the sole legal tender. Dollarization is a complete surrender of the authorities’ independent control over domestic monetary policy, and as such, can be viewed as the hardest form of a pegged regime.

### Exchange Regimes with No Separate Legal Tender (Currency Unions)

The member belongs to a monetary or currency union in which they share the same legal tender. By adopting such regimes the authorities also surrender control over domestic monetary policy and, hence, such regimes are also viewed as a hard exchange rate peg.

### Currency Board Arrangements (CBAs)

An exchange rate regime based on an explicit legislative commitment to exchange domestic currency for a specified foreign currency at a fixed exchange rate, combined with restrictions on the issuing authority to ensure the fulfillment of its legal obligation. This implies that domestic currency remain fully backed by foreign assets, eliminating traditional central bank functions such as monetary control and lender of last resort. While leaving little scope for discretionary monetary policy, some flexibility may be afforded depending on the strictness of the board’s rules.

### Conventional Fixed Peg Arrangements: Vis-à-vis a Single Currency or a Currency Composite

The country (formally or de facto) pegs its currency at a fixed rate to another currency or a basket of currencies, where a basket is formed from the currencies of major trading or financial partners and weights reflect the geographical distribution of trade, services, or capital flow. The currency composites can also be standardized, such as that of the SDR. There is no commitment to keep the parity irrevocably. The exchange rate may fluctuate within a narrow margin of less than  $\pm 1$  percent around a central rate or the maximum and minimum value of the exchange rate remains within narrow margin of 2 percent for at least three months. The authorities stand ready to keep the fixed parity through direct (i.e., via sale/purchase of foreign exchange in the market) or indirect intervention (e.g., via aggressive use of interest rate policy, imposition of foreign exchange regulations or exercise of moral suasion that constrain foreign exchange activity, or through intervention by other public institutions). Flexibility of monetary policy, though limited, is greater than in hard pegs, as traditional central banking functions are still possible, and the authorities can adjust the level of the exchange rate, though relatively infrequently.

### Crawling Pegs: Forward and Backward Looking

The currency is adjusted periodically vis-à-vis a single currency or a basket in small amounts at a fixed rate or in response to changes in selective quantitative indicators (past inflation differentials with major trading partners, differentials between the targeted or projected inflation with major trading partners, differentials between official and parallel market rates, etc.). Distinction is made

between backward- and forward-looking crawls: the crawl is viewed as “backward looking” when the crawl is set to generate inflation adjusted changes in the currency (i.e., when it aims to passively accommodate past inflation differentials under a real exchange rate rule); and as “forward looking” when the exchange rate is adjusted at a preannounced fixed rate and/or set below projected inflation differentials, typically when the exchange rate is envisaged to have an anchor role. Maintaining a credible crawling peg imposes similar constraints on monetary policy as a fixed peg system, particularly in a forward-looking crawl, as the authorities are expected to intervene to ensure the targeted fixed depreciation path. The degree of intervention in a backward-looking crawl is expected to be less given the lack of commitment to a fixed depreciation path and the absence of a need to anchor expectations.

#### Pegged Exchange Rates Within a Horizontal Band

The currency is allowed to move within margins of fluctuation of at least  $\pm 1$  percent around a formal or a de facto fixed central rate. The authorities stand ready to defend the limits of the band through direct or indirect intervention to maintain the exchange rate within these limits. Some limited degree of monetary policy discretion can be afforded, with the degree of discretion depending on the band width.

#### Pegged Exchange Rates Within Crawling Bands: Forward and Backward Looking

The currency is maintained within fluctuation margins of at least  $\pm 1$  percent around a formal or a de facto central rate, which is adjusted periodically in small amounts at a fixed rate, or in response to changes in selective quantitative indicators. A similar distinction is made between backward- and forward-looking crawls. The degree of exchange rate flexibility is a function of the band width; bands can be chosen to be either symmetric or fixed around a crawling parity or to widen gradually with an asymmetric choice of the crawl of upper and lower bands (in the latter case, there may not be a preannounced central rate). The commitment to maintain the exchange rate within the band continues to impose constraints on monetary policy, with the degree of policy independence a function of the bandwidth.

#### Tightly or Other Managed Floating with No Predetermined Path for the Exchange Rate

The authorities influence exchange rate movements through active intervention to counter the long-term trend of the exchange rate, without specifying a predetermined exchange rate path, or without having a specific exchange rate target (“dirty floats”). Intervention may be direct or indirect. Indicators for managing the rate are broadly judgmental (e.g., balance of payments position, international reserves, parallel market developments), and adjustments may not be automatic. Distinction is made between “tightly managed floating” (where intervention takes the form of very tight monitoring that generally results in a stable exchange rate without having a clear exchange rate path, so as to permit the authorities an extra degree of flexibility in deciding the tactics to achieve a desired path) and “the managed floating” (where the exchange rate is influenced in a more ad hoc fashion).



### Independently Floating

The exchange rate is market determined, any foreign exchange intervention aims at moderating the rate of change and preventing undue fluctuations in the exchange rate that are not justified by economic fundamentals, rather than at establishing a level for the exchange rate. In these regimes, monetary policy is in principle independent of exchange rate policy.

## REFERENCES

- Alesina, A./Wagner, A. F., Choosing (and reneging on) exchange rate regimes, in: *Journal of the European Economic Association*, 2006, Vol. 4 (4), pp. 770–799.
- Bank for International Settlements (BIS), *76<sup>th</sup> Annual Report*. 1 April 2005–31 March 2006, Basel, June 2006.
- Bender, D., Wechselkursbindung in Entwicklungsländern: Eine optimale Anpassungsstrategie an flexible Wechselkurse? In: *Kredit und Kapital*, Vol. 18, No. 3, 1985, pp. 184–190.
- Bubula, A. /Otker-Robe, I., The Evolution of Exchange Rate Regimes Since 1990: Evidence From De Facto Policies. *IMF Working Paper* 02/155, Washington, D. C., 2002.
- Dorn, J. A., A Zone of Monetary Stability in East Asia. Comment on Genberg, in: Genberg, H., Exchange Rate Arrangements and Financial Integration in East Asia: On a Collision Course? *Österreichische Nationalbank, Working Paper* No. 122, Vienna 2006, pp. 21–35.
- Eichengreen, B./Tong, H., Fear of China, in: *Journal of Asian Economics*, Vol. 17, 2006, pp. 226–240.
- Emminger, O., Zwischenbilanz der DM-Aufwertung, in: *Schriftenreihe zu aktuellen Problemen aus Politik und Wirtschaft*. Herausgegeben vom schweizerischen Institut für Auslandsforschung. Heft 4/1970, pp. 1–20.
- Flood, R. P./Garber, P., Collapsing Exchange Rate Regimes: Some Linear Examples, in: *Journal of International Economics*, Vol. 17, 1984, pp. 1–13.
- Flood, R. P./Marion, N. P., Policy Implications of “Second Generation” Crisis Models. *IMF Working Paper* 97/16, Washington, D. C., November 1996.
- Gärtner, M./Lutz, M., *Makroökonomik fester und flexibler Wechselkurse*, Berlin/Heidelberg/New York 2004.
- Genberg, H., Exchange Rate Arrangements and Financial Integration in East Asia: On a Collision Course? *Österreichische Nationalbank, Working Paper* No. 122, Vienna 2006, pp. 1–20.
- Goldstein, M., Adjusting China’s exchange rate policies. *IIE Working Paper*, Washington, D. C., 2004.
- Goodfriend, M./Prasad, E., A Framework for Independent Monetary Policy in China. *IMF Working Paper* No. 06/111, Washington, D. C.
- Hanndelsblatt, various issues, Düsseldorf 2006
- Hoffmann, W. G., Zum „Pro“ und „Con“ der Aufwertung, in: *Volkswirtschaftliche Korrespondenz der Adolf-Weber-Stiftung*, Vol. 8, No. 10/1969, pp. 1–4.
- Heiduk, G. S., *Außenwirtschaft - Theorie, Empirie und Politik der interdependenten Weltwirtschaft*. Heidelberg: Physica-Verlag, 2005.
- International Monetary Fund, *IMF Survey*, Washington D. C., various issues, 2004–2006.
- Köhler, C., Die Aufwertung der Deutschen Mark. Geldstromanalyse für das 3. Vierteljahr 1969, in: *Wirtschaftswissenschaftliche Mitteilungen*, Bd. 22, Heft 12, pp. 348–352.
- McKinnon, R./Schnabl, G., China’s Exchange Rate and International Adjustment in Wages, Prices, and Interest Rates : Japan Déjà Vu? *CESifo Working Paper* No. 1720, Munich, May 2006.
- Mohanty, M. S./Turner, P., Foreign exchange reserve accumulation in emerging markets; what are the domestic implications? In: *BIS Quarterly Review*, September 2006, pp. 39–52.
- Obstfeld, M., The Logic of Currency Crises, in: Banque de France, *Cahiers économiques et monétaires*, No. 43, 1984, pp. 189–213.
- Obstfeld, M., Destabilizing effects of exchange-rate escape clauses, in : *Journal of International Economics*, Vol. 43, 1997, pp. 61–77.
- Pinto, B., Unification of Official and Black Market Exchange Rates in Sub-Saharan Africa: Monetarism in the Tropics?, in: E.-M. Claassen (Hrsg.), *Exchange Rate Policies of Less Developed Market and Socialist Economies*. Second International Conference FU and Landeszentralbank Berlin, San Francisco and Panama 1991, pp. 351–356.

- Prasad, E./Rumbaugh, T./Wang, Q., Putting the Cart before the Horse? Capital Account Liberalization and Exchange Rate Flexibility in China. *IMF Policy Working Paper* 05/01, Washington, D. C.
- Salin, E., Die Aufwertung der DM, das Faktum und die Folgen, In: A. Heertje (Ed.), *Schaarste en welvaart : Opstellen aangeboden aan Prof. Dr. P. Hennipman ter gelegenheid van zijn vijftieng-jarig hoogleraarschap aan de Universiteit van Amsterdam*. Leiden: Stenfert Kroese, 1971, pp. 196–201.
- Schmitz, Peter M. and U. Koester, The Sugar Market Policy of the European Community and the Stability of World Market Prices for Sugar, in: *International agricultural trade: advanced readings in price formation, market structure, and price instability*. Boulder, Colo [u.a.] : Westview Press, (1984), S. 235–259.
- Sell, F. L., “True Exposure”: The Analysis of Trade Liberalization in a General Equilibrium Framework, in: *Weltwirtschaftliches Archiv*, Band 124, Heft 4/1988, pp. 635–652.
- Sell, F. L., *Contagion in Financial Markets*. Edward Elgar Publishing Ltd. Cheltenham (UK) und Northampton, MA (USA) 2001.
- Siebert, H., China – Understanding a new global player. *Kiel Working Paper No. 1278*, Kiel, June 2006.
- Tokarick, S., A tax on imports is a tax on exports, in: *IMF Survey*, Washington D. C., Vol. 35, No. 10, pp. 156–157.
- Wirtschaftswoche, various issues, Düsseldorf 2006.
- Xie, P., China’s Monetary Policy: 1998-2002. *Stanford Center for International Development Working Paper* No. 217, Stanford, California: Stanford University 2004.
- Zimmermann, F., DM-Aufwertung: Währungen und Wirtschaft, in: *Der Schweizer Treuhänder. Monatszeitung für Wirtschaftsprüfer*, Bd. 43, Heft 12, 1969, pp. 392–399.